Voice Controlled Home Automation

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Abstract-*The project Voice controlled home automation project helps to control the electrical loads based on Bluetooth input signal. The Bluetooth device receives this input signal from android device. This system is especially beneficial in case of handicapped or aged people who find it difficult to walk and operate the electrical switches to turn on or off the loads. This system solves this issue as now the user just has to give voice commands to turn on or off the loads. Here 4 loads are used to demonstrate light, fan, heater and AC. All these loads can be individually turned ON/OFF or all loads at the same time. This system solves the issue by interfacing a unit with home appliances that switches these loads based on the input received from adroid device. The Android app also provides an effective GUI for providing this functionality.This system makes use of arduino microcontroller. The Bluetooth receiver is interfaced with microcontroller in order to accept the commands and then react accordingly. It operates the loads through a set of relays using a relay driver IC. Relays are used as electromagetic switch.*

Keywords-Microcontroller, Bluetooth module, Relay, relay driver, Aurduinouno, Android App.

I. INTRODUCTION

The new age of technology has redefined communication. Most people nowadays have access to mobile phones and thus the world indeed has become a global village. At any given moment, any particular individual can be contacted with the mobile phone. But the application of mobile phone cannot just be restricted to sending SMS or starting conversations. New innovations and ideas can be generated from it that can further enhance its capabilities. Technologies such as Infra-red, Bluetooth, etc which has developed in recent years goes to show the very fact that improvements are in fact possible and these improvements have eased our life and the way we live. Remote management of several home and office appliances is a subject of growing interest and in recent years we have seen many systems providing such controls.

We have used the very concept to design a system that acts a platform to receive messages which in fact are commands sent to control different appliances and devices connected to the platform. We have designed a control system which is based on the Bluetooth technology that effectively allows control from a remote area to the desired location. The application of our suggested system is immense in the ever changing technological world. It allows a greater degree of freedom to an individual whether it is controlling the household appliances or office equipment. The need to be physically present in order to control appliances of a certain location is eliminated with the use of our system.

II. PROBLEM DEFINITION

Did I forget to switch of the fan? What is the correct position of switches? How can I save the energy and improve the quality of life? With this lot of questions we find a solution on these problem and try to a system which is controlled all this appliances. If house is so big then it is very difficult to switch off/on the home appliances like fan, tv, heater, bulb, etc. Sometime we forget to switch off them when we go out of the house, that increases electricity consumption and it also effects on money. Considering all these problems, the VCHA system is very useful to control all this home appliances. Normally the home automation systems which are available in market are very expensive so that not many can afford these systems, so here we make a system that everybody can afford to use it and take benefits of all the functions. Does user need extra module to control them? Answer is no because in this VCHA system there is an android application which controls all these appliances using bluetooth from anywhere in the house. So that is beneficiary to the user, it is easy to install and use so there is no need for extra knowledge, because everybody nowadays familiar with smartphone.

III. RELATED WORK

A smart home is always incomplete because there is many things to do. Home automation gives you the many function to control. On this home automation project there are many control technique are used to control them. Some scholarly journals and literature some of are and how it will help to design this system and sustainable development. This project is mentioned in reference.[1]

This paper presents a novel solution that makes this future a bit nearer. Voice controlled automation, as well as a universal remote control application on an Android platform,

has been presented. Using the Bluetooth module HC-05, Arduino Uno, and Android application, voice controlled automation, as well as the universal switch, has been realized. [2]

In this paper, they present the voice command recognition is achieved using a dedicated hardware module and an Arduino micro-controller board for commands processing and control. Performance evaluation is carried out by developing a multi-functional miniature prototype of the SHAS. [3]

In this paper, they discuss possible developments of Bluetooth wireless technologies and describe the hardware for devices and software for the considerations of a home automation system.

IV. WORKING PRINCIPLE

This project mainly consists of three units: a Bluetooth Module, Arduino UNO (ATMega328P), relay, android phone. The Bluetooth module is implemented on the kit itself. We give voice signal to mobile phone then Bluetooth on the phone is already paired with Bluetooth module on the kit. The module receives the voice signal from the user and gives acknowledgment to the microcontroller via Bluetooth module which is mounted on kit. Bluetooth module passes this signal to the microcontroller. The microcontroller then receives the voice signal and processes it as per the instruction applied in the programing of the microcontroller.

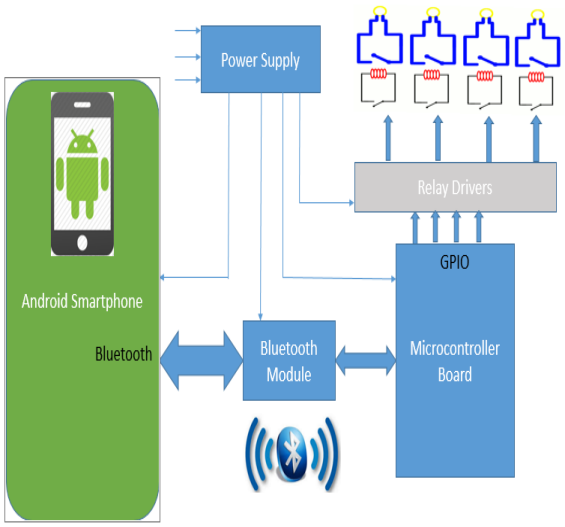

Fig 4.1 Block Diagram of System

After extracting the voice signal the microcontroller then gives command to the relay driver to make on or off the respective output, the relay driver then takes the necessary action and switch ON or Switch OFF the appliances by passing a signal to the Relay connected to the load. Relay driver has total control over all the connected relays and hence the commands given by microcontroller are successfully passed from the microcontroller to the relays which are connected at output load. Once the action has been implemented i.e. once the component at load is made ON or OFF according to the command, the microcontroller receives information about it. Then Microcontroller sends a feedback through the Bluetooth Module regarding the current status of that respective appliance.

V. SYSTEM OVERVIEW

A. ATMega328P

The microcontroller to be used for the development is ATMega328P which is available on Arduino UNO board, The **Arduino Uno** is a microcontroller board based on the ATmega328 It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button.This empowers system designer to optimize the device for power consumption versus processing speed.

B. Bluetooth Module HC-05

This module is the means of connection with the android smartphone using Bluetooth.The module selected is HC-05.This will receive data/instructions from the android phone and communicate the same with microcontroller using serial communication Frequency is 2.4~2.524 GHz and Serial communications: 9600-115200bps

C. RELAY

The relay driver is used to isolate both the controlling and the controlled device. The relay is an electromagnetic device, which consists of solenoid, moving contacts (switch) and restoring spring and consumes comparatively large amount of power.

D. ANDROID APPLICATION

This is the operating part of the system.All the appliances are controlled by this device.

The network protocol to be used is Bluetooth, which is supported by all android phones.

The planned UI design of the android application is as shown

Fig. 5.1 Android App Overview

VI. IMPLEMENTATION METHODOLOGY

The implementation of the system which is voice controlled home automation with smart automation interference and easy to use. Flow chart explains the working of the system step by step.

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B. Flow chart

This is flow chart of whole system which explains the decision of systems based on the conditions come to the smartphone android application and it process further on microcontroller calculation.

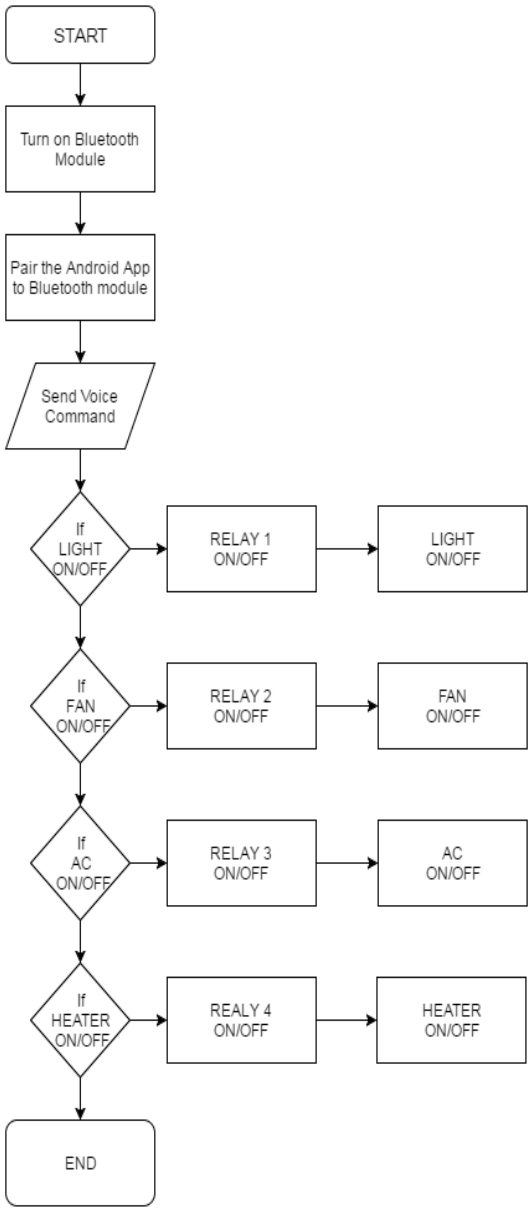

Fig 6.1 flowchart of system

As per fig 6.1 Android app will start first then it pair with near Bluetooth module after successful connection user send the voice command to microcontroller and basis on the input command microcontroller take action ON/OFF respective relay.

VII. EXPERIMENT RESULTS & DISCUSSION

As here in this system we use an android application to control the home appliances so an android app uses the google speech recognition system. Basis on input command the microcontroller take necessary action and turn ON/OFF relay so that the respective load or home appliances will ON/OFF. Below we will see the Relay condition on the basis of input.

VOICE COMMAND	**RELAY**	**LOAD**
BULB ON/OFF	RELAY 1 ON/OFF	BULB ON/OFF
FAN ON/OFF	RELAY 2 ON/OFF	FAN ON/OFF
HEATER ON/OFF	RELAY 3 ON/OFF	HEATER ON/OFF
TV ON/OFF	RELAY 4 ON/OFF	TV ON/OFF

Table 1.Relay position base upon i/p condition

VIII. CONCLUSION

Voice Controlled Home Automation is a very different concept than what is presently available in h market. This would make automation more easy and intuitive. The people will be able to interact with the system. It also is an important aspect in the present world where people are so busy, this would help them in easing the basic functionality of their life. The world around us is going digital in every aspect we can imagine and it is happening fast, we also need to move forward with it. Our system is a great initiative step in automation, it would also provide with security. As it is based on voice recognition we can assign particular password to each user and the automation will respond to the correct passwords only.

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